W. D. FREDRICK.

GLASS BLOWING MACHINE.

APPLICATION FILED DEC. 29, 1905.

975,759.

Patented Nov. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

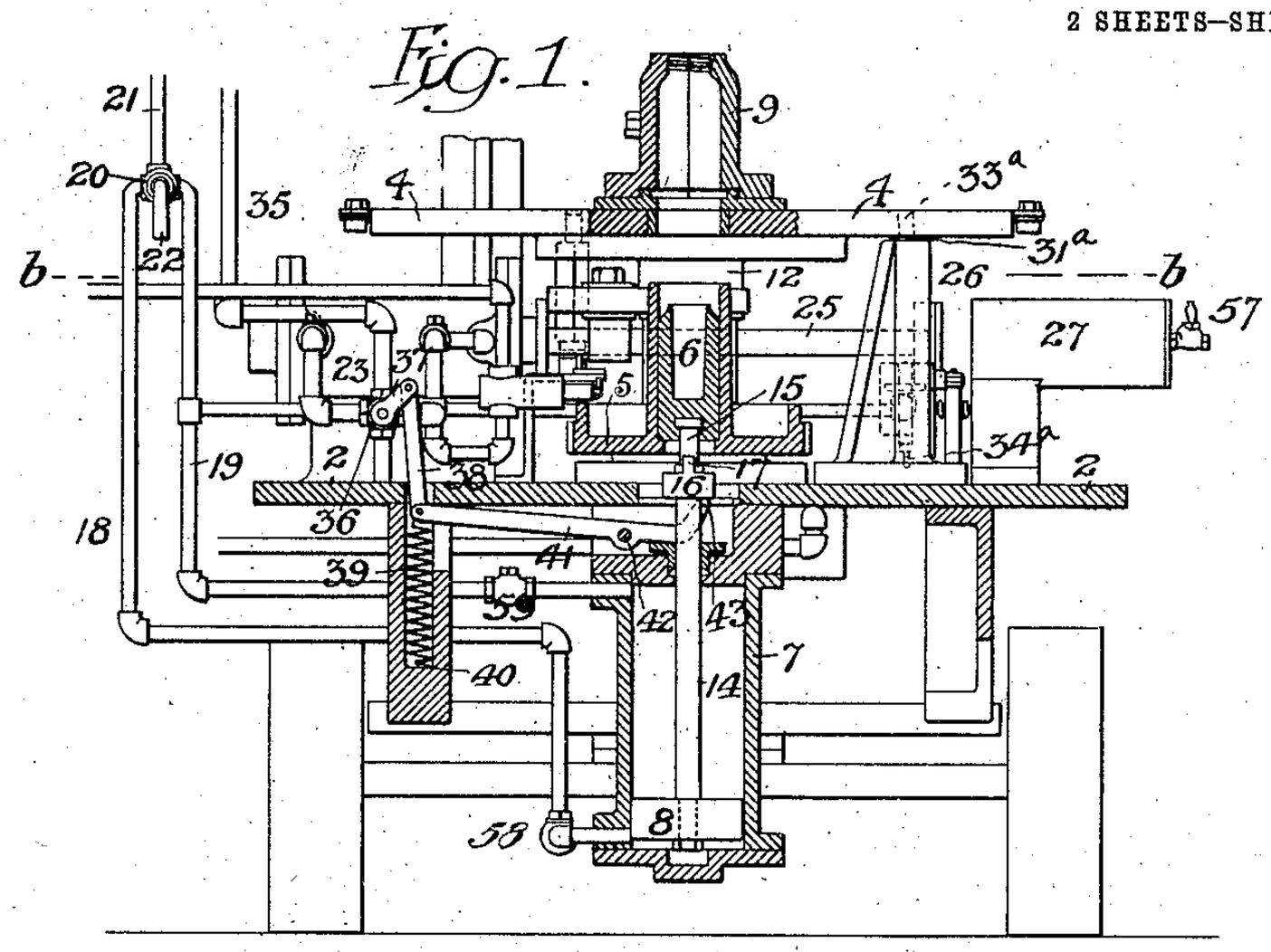
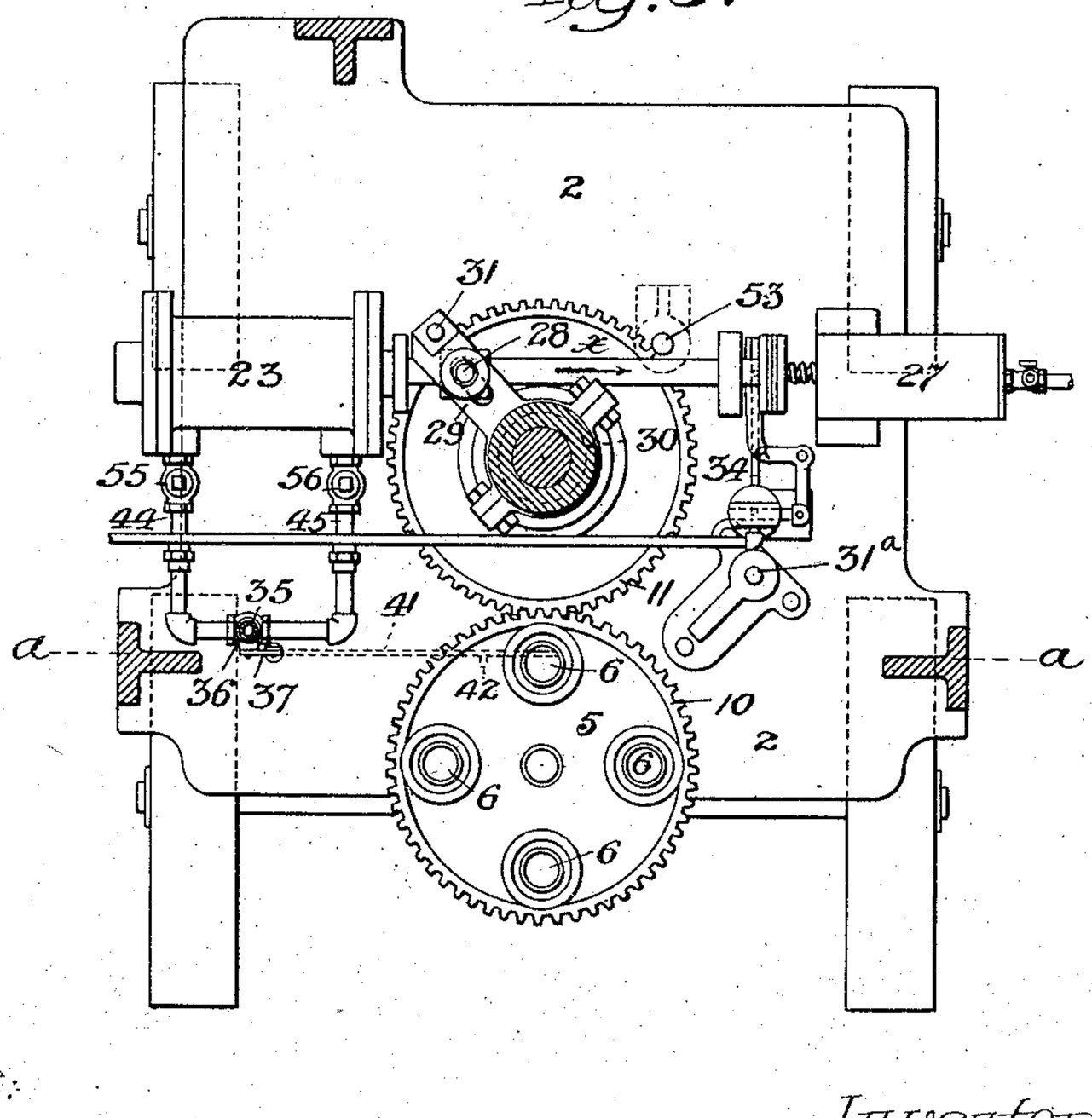


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

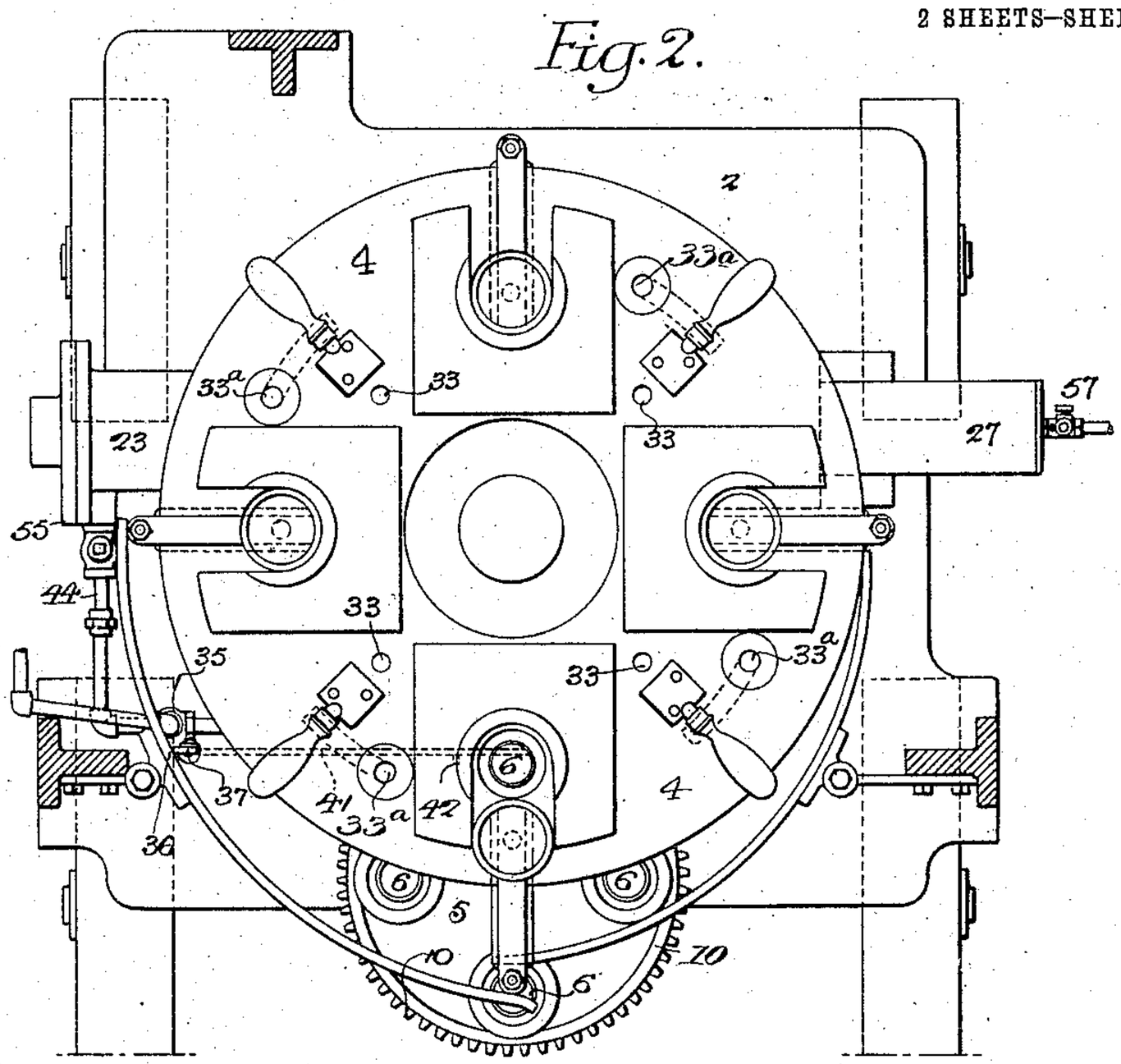


Fig. 4.

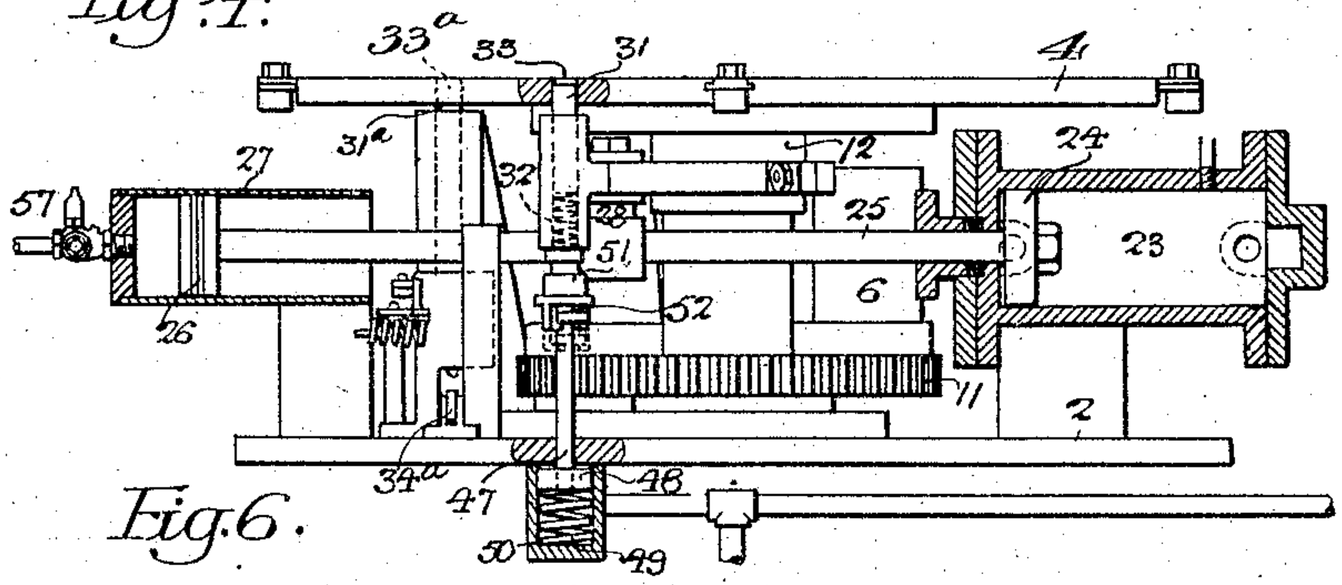
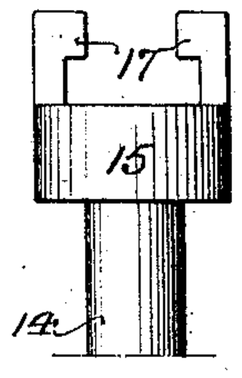
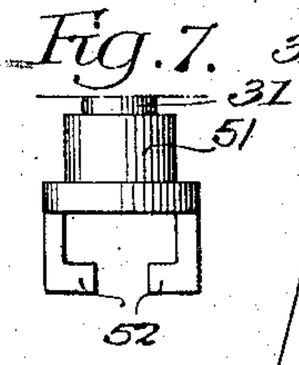


Fig. 6.

Fig. 7.





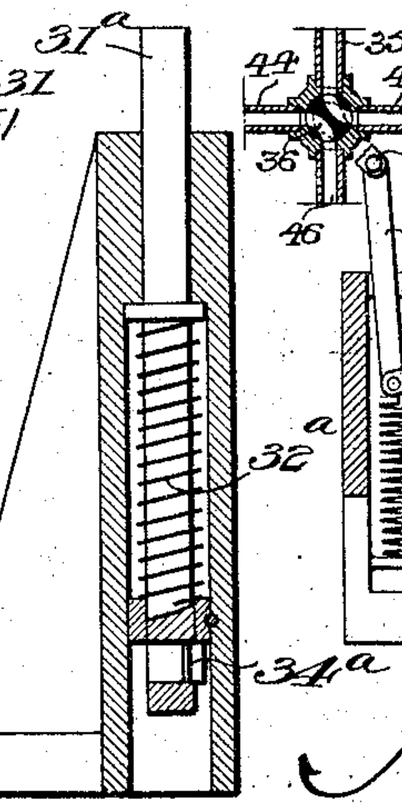
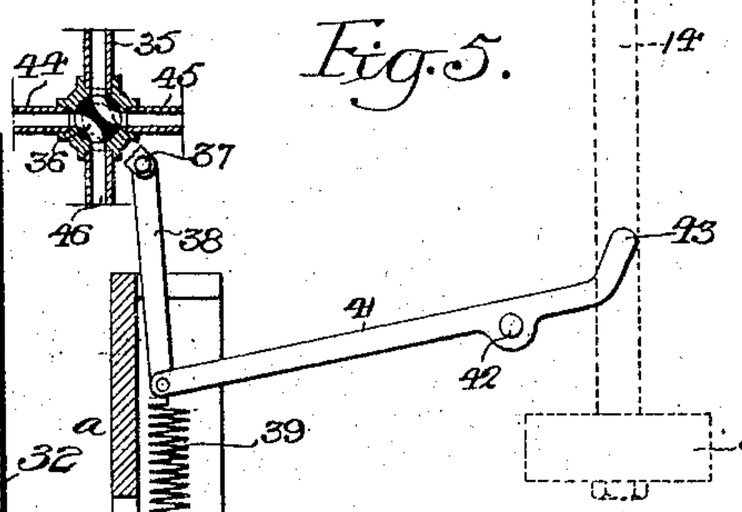


Fig. 8.

Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM DAYTON FREDRICK, OF BRIDGETON, NEW JERSEY, ASSIGNOR TO MILLVILLE MACHINE COMPANY, OF MILLVILLE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GLASS-BLOWING MACHINE.

975,759. Specification of Letters Patent. **Patented Nov. 15, 1910.**

Original application filed June 6, 1905, Serial No. 263,978. Divided and this application filed December 29, 1905. Serial No. 293,858.

To all whom it may concern:

Be it known that I, WILLIAM DAYTON FREDRICK, a citizen of the United States, and a resident of Bridgeton, Cumberland county, New Jersey, have invented certain Improvements in Glass-Blowing Machines, of which the following is a specification.

My present invention, which is a division of an application for patent filed by me June 6, 1905, Serial No. 263,978, relates to machines for blowing hollow glass-ware, and consists of certain improvements in that class of apparatus designed to effect automatically, by the aid of fluid under pressure, air for instance, the intermittent rotation of a carrier supporting the blow-molds; means for automatically arresting the movement of such carrier gradually, means for effecting the automatic rotation of a press-mold carrier; the movement of such carriers bearing a definite relation to each other so that when they stop one set of the molds supported thereby are in registry; means for automatically raising the press-molds into the blow-molds at regular intervals to receive a charge of glass which is subsequently recessed by a plunger, such action forming the neck and shoulder of the article of hollow-ware; means for withdrawing the press-mold; means for effecting the partial movement of the carrier supporting the blow-molds to a position for blowing the charge of glass within said molds, and means for effecting the further movement of the carrier supporting the blow-molds for the purpose of removing the finished article.

Other features of the invention and the details of construction will be fully pointed out hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, is a front elevation, partly in section on the line *a*—*a*, Fig. 2, of sufficient of a glass-blowing machine to illustrate the subject of my present invention; Fig. 2, is a plan view showing the blow-mold carrier; Fig. 3, is a sectional plan view, taken on the line *b*—*b*, Fig. 1, showing the press-mold carrier, the means for operating the same and the fixed table below the blow-mold carrier; Fig. 4, is a rear elevation of the mechanism for rotating the blow-mold carrier, showing the cylinders in section; Fig. 5, is a detached view, illustrating the valve controlling the fluid pressure passing to the piston for effecting the movement of the blow-mold carrier and the mechanism for operating said valve; Figs. 6 and 7, are detached views illustrating details of my invention, and Fig. 8, is a vertical sectional view of a part of my invention.

The improved machine forming the subject of my invention, together with its operative mechanism is mounted upon a carriage 1 having a fixed table 2. This table has a central stem 3 providing a journal for the rotatable blow-mold carrier 4. In addition, the table 2 carries means for effecting the rotation of the blow-mold carrier; means for stopping and locking the same after each quarter revolution; a rotating carrier 5 supporting a series of press-molds 6; and a cylinder 7 having a piston 8 which is employed to move said press-molds into and out of a series of blow-molds 9, (only one of which is shown), mounted on the carrier 5. The blow-molds are provided with bottoms movable by suitable means out of and into their operative position with relation to said molds by and during the rotation of the blow-mold carrier, all of which is described in my application before referred to.

The press-molds 6 are disposed below the carrier 4, and the carrier 5 supporting said press-molds has a gear wheel 10 meshing with another gear wheel 11 of the same diameter, keyed to and rotating with the hub 12 of the carrier 4 so that for every quarter-turn of this latter carrier, a fresh press-mold will be in position to be raised into a fresh blow-mold to receive a charge of glass; its movable bottom being automatically withdrawn to permit the insertion of the press-mold as said blow-mold is moved to the charging position. At the lower end of the central stem 3, a ball-bearing may be provided so that friction due to the movement of the carrier 4 will be as little as possible.

Beneath the table 2, the cylinder 7 is mounted, having a rod 14 and piston 8, which rod, when pressure is applied to the under side of its piston, serves to push one of the press-molds into one of the blow-molds disposed above and in registry therewith, ready to receive a charge of glass. After the charge of glass has been pressed, the piston 8 in the cylinder 7 is depressed, carrying with it the rod 14 which withdraws

the blank or press-mold, the glass meanwhile being suspended in the neck of the blow-mold. The press-molds are provided with depending headed stems 15, and the upper end of the rod 14 has a slotted head 16 with inwardly projecting jaws 17 to engage the heads of said stems. The press-molds being supported by a rotating carrier, the jaws of the head 16 are so arranged that the headed stems 15 of said molds moving in the arc of a circle can enter and leave without obstruction, but when disposed centrally over said rod they are engaged by the jaws 17 of its head and may be moved up or down.

Pressure to operate the piston 8, enters through the pipes 18 and 19 which are connected by a three-way valve 20 and receive their pressure from a pipe 21. The valve may be operated by a handle 22.

As soon as the press-mold 6 has been withdrawn after the formation of the blank, the carrier 4 is ready to be moved a quarter turn, during which time the blow-mold bottom is pushed into place, and this movement of the carrier is effected by the following mechanism:

Carried by the table 2 at the rear of the machine, is a cylinder 23 in which a piston 24 carried by a rod 25 reciprocates, the opposite end of which rod is provided with a smaller piston 26 arranged to enter an open-ended cup or auxiliary cylinder 27 forming a dash pot, and which, when said piston is entering, serves to retard the movement of the blow-mold carrier as it nears the end of its quarter turn. The rod 25 carries a pivot connection 28 for the end of a crank arm 29, which is journaled in a groove 30 formed in the hub 12 of the carrier 4, and this arm, in combination with a pin 31 supported by a spring 32 and adapted to enter an aperture therein, is employed to move said carrier. In Fig. 3, the crank arm is shown in position to engage the carrier (not shown) and move the same a quarter turn, while in Fig. 4, the pin is shown in engagement with the carrier at the end of the quarter turn. The carrier has a series of apertures 33 for engagement by the pin 31, so that when the arm is moved in the arc of a circle by its connection with the rod 25, the carrier will be moved with it, the arm being slotted at 34 for proper engagement with said pivot connection.

The pin 31 is held in engagement with the carrier by the spring 32, and after said carrier has been moved a quarter turn, (the extent of movement of the crank arm 29,) it is to be locked or held against further movement during the various steps incident to the formation of the hollow glass-ware under process of manufacture. For this purpose, said carrier is provided with another series of apertures 33^a, and a pin 31^a is arranged to be projected into one of said holes, of which there are four, when the carrier 4 reaches the end of its quarter turn. Leading to each of these apertures is an inclined surface on the under side of the carrier so that said pin may start to engage the carrier before the latter comes to the limit of its movement, and this pin is maintained in engagement with the carrier by means of a spring 32^a clearly shown in the sectional view, Fig. 8. When it is desired to impart further movement to the carrier, the pin 31^a is withdrawn therefrom by means of a lever 34^a. This mechanism is fully described in my application for patent above referred to and as it forms no part of my present invention it need not be further described.

Pressure to operate the piston 24 is delivered by the pipe 35, and is controlled by a four-way valve 36 having an arm 37 by which it may be operated. A link 38 is connected at one end to this arm and at its opposite end to a coiled spring 39 anchored at 40. A lever 41 pivoted at 42 is also connected to the link 38, and this lever has an upwardly projecting end 43 lying in the path of the head 17 of the piston rod 15. In Fig. 1, the piston rod is in the lowered position, and the valve 36 has been moved by the mechanism noted above to a position to permit pressure to enter the cylinder through the pipe 44, moving the piston 24 in the direction of the arrow *x*, Fig. 2; thereby moving the carrier a quarter-turn. When the piston rod 14 is next raised to lift a press-mold into one of the blow-molds to receive a charge of glass, the lever 41 will be released, permitting the spring 39 to shift the valve 36, through the medium of the link 38 and arm 37, to the position shown in the diagram view, Fig. 5, and pressure from the pipe 35 will enter the pipe 45 leading to the cylinder 23 to retract the piston, the valve meanwhile permitting pressure to exhaust through the pipe 44 and the common exhaust outlet 46. Upon lowering the piston rod 14 to withdraw a press-mold, the valve 36 will be again shifted by the engagement of the head 16 with the end 43 of the lever 41, and pressure entering the cylinder through the pipe 44, the carrier will be moved another quarter-turn, and so on. Before the carrier can be given further movement, however, it is necessary to disengage the driving means and retract the same for a fresh engagement. The pin 31 is withdrawn by means of a rod 47 connected to a piston 48, supported by a spring 49 and disposed in a cylinder 50 mounted beneath the fixed table 2. The lower end of the pin 31 has a head 51 with jaws 52 to engage the head 53 of the rod 47, and pressure being admitted to act upon the piston 48, said rod will be withdrawn and with it said pin; thereby releasing the crank arm from its connec-

tion with the carrier. Immediately following this action, pressure is admitted to the cylinder 23 through the pipe 45, and this pressure moving the piston 24 and rod 25, the crank arm 29 will be retracted until its pin 31 is directly beneath another opening 33 in the carrier into which it will enter under the influence of the spring 32. The mechanism is now ready to move the carrier another quarter turn, and this action may take place as soon as the press-mold is withdrawn and after the pin 31ª is released. As the arm 29 is retracted, the jaws 52 of the pin 31 are carried out of engagement with the head 53 of the rod 47 for lowering the same.

It is desirable that the carrier 4 be brought to a stop with as little jar as possible in order that the articles of hollow-ware in process of manufacture and disposed within the blow-molds, shall not be displaced and caused to engage one side or the other of the molds, a condition which would cause a faulty finished article. For this purpose, the pipes 44 and 45 leading to the cylinder 20 are provided with check-valves 55 and 56, and the auxiliary cylinder 27 is provided with a check valve 57, each of said valves having means to permit bleeding of the pressure so that they gradually exhaust at one end or the other as the pressure is entering the opposite end. This device operates as a brake to check the movement of the carrier as it approaches its position of rest, permitting a movement that is fast enough but one in which the stoppage is so gradual that no harm may come to the article being blown. The cylinder 7 is also provided with check-valves 58 and 59 connected to its combined pressure delivering and exhaust pipes 18 and 19 respectively. These check valves are placed at points to intercept back pressure or exhaust during certain parts of the operation of the machine. They are fully described in my application above referred to, and specifically claimed in an application for patent filed by me June 6, 1905, Serial No. 263,977.

I claim:

1. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, means for moving the press-molds into and out of the blow-molds, means for moving the carriers, and means operated by the press-mold operating means for controlling the movement of the carriers.

2. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, means for moving the press-molds into and out of the blow-molds, means actuated by fluid pressure for moving the carriers, and means operated by the return of the press-mold operating means for directing the fluid pressure to effect the movement of the carriers.

3. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison one by the other to bring a set of their respective molds in registry, a plunger for moving the press-molds into and out of the blow-molds, means for moving the carriers, means controlling movement of the carriers, and means operated by the press-mold operating means for actuating said controlling means.

4. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison one by the other to bring a set of their respective molds in registry, a fluid actuated plunger for moving the press-molds into and out of the blow-molds, means actuated by fluid pressure for moving the carriers, a valve controlling the fluid pressure to effect the movement of the carriers, and means operated by the return of the press-mold operating means for shifting said valve.

5. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, a plunger for moving the press-molds into and out of the blow-molds, a piston for moving said plunger, means for moving the carriers, means controlling the movement of the carriers, and a lever operatively connected at one end to the controlling means and having its opposite end in line with the press-mold plunger whereby when said plunger returns the controlling means are actuated.

6. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, a plunger for moving the press-molds into and out of the blow-molds, a fluid operated piston for moving said plunger, means actuated by fluid pressure for moving the carriers, a valve controlling the fluid pressure to effect the movement of the carriers, and a lever operatively connected at one end to the valve and having its opposite end in line with the press-mold plunger whereby when said plunger returns the valve will be shifted.

7. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, means for moving the press-molds into and out of the blow-molds, a cylinder, a piston therein, a connection between said piston and the blow-mold carrier whereby the latter will be actuated by the piston when the latter is moved in one direction, means for

supplying motive fluid to said cylinder, and means actuated by the return of the press-mold lifting means for controlling such supply.

8. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, means for moving the press-molds into and out of the blow-molds, a cylinder, a piston therein, a connection between said piston and the blow-mold carrier whereby the latter will be actuated by the piston when the latter is moved in one direction, means for supplying motive fluid to said cylinder, a valve controlling such supply, and a lever actuated by the return of the press-mold lifting means for controlling said valve.

9. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, means for moving the press-molds into and out of the blow-molds, a cylinder, a piston therein, a connection between said piston and the blow-mold carrier whereby the latter will be actuated by the piston when the latter is moved in one direction, means for supplying motive fluid to said cylinder to effect such action, a valve controlling such supply, a lever actuated by the return of the press-mold lifting means for actuating said valve to direct pressure for effecting the movement of the carriers, and means for automatically turning said valve to admit pressure to the opposite end of the cylinder to shift the piston and the connection between it and the blow-mold carrier for a fresh engagement therewith, when the press-mold lifting means are raised.

10. In a glass blowing machine, the combination of a blow-mold carrier and a press-mold carrier movable in unison to bring a set of their respective molds in registry, means for moving the press-molds into and out of the blow-molds, a cylinder, a piston therein, a connection between said piston and the blow-mold carrier whereby the latter will be actuated by the piston when the latter is moved in one direction, means for supplying motive fluid to said cylinder to effect such action, a valve controlling such supply, a lever actuated by the return of the press-mold lifting means for actuating said valve to direct pressure for effecting the movement of the carriers, and a spring for turning said valve to admit pressure to the opposite end of the cylinder to shift the piston and the connection between it and the blow-mold carrier for a fresh engagement therewith when the press-mold lifting means are raised.

11. The combination in a glass blowing machine, of a blow-mold carrier rotatably mounted, means for rotating the same, a cylinder, a series of press-molds, a plunger mounted in said cylinder and adapted to move said press-molds into and out of the blow-molds, means for placing the carrier moving mechanism in the operative position, said means operating automatically when the press-mold plunger is raised, and means for effecting the operation of the carrier moving mechanism, said means being actuated when the press-mold plunger is lowered.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM DAYTON FREDRICK.

Witnesses:
MURRAY C. BOYER,
JOS. H. KLEIN.